



OIL-INJECTED ROTARY SCREW AIR COMPRESSORS

INSTALLATION/MAINTENANCE/ USER MANUAL
(SUITABLE FOR ALL TAITIAN MODELS)



1 SAFETY PRECAUTIONS

- 1.The new machine must be operated and installed by authorized,trained personnel.
- 2.The power supply line leading to the compressor must be equipped with safety devices such as air switch and fuse. In order to ensure the reliability of electrical equipment, be sure to connect a suitable grounding wire in accordance with the relevant safety regulations, and install a lightning protection device if necessary. When installing, consider leaving a certain maintenance space around the compressor equipment.
- 3.When starting up the machine for the first time or the power line has been changed, you must pay attention to the rotation direction of airend unit whether it is correct, The method is to turn on the compressor for a while (about 1 second) before starting, and check the direction of rotation. Otherwise, it may cause damage to the airend unit of the air compressor in just a few seconds.
- 4.The air compressor must not be operated at a discharge pressure higher than that specified on the nameplate,otherwise the motor will be overloaded and shut down.
- 5.The compressed air and electric devices are both dangerous,When overhauling or maintaining,make sure that the power supply is cut off and the compressed air is completely released.The power box should be locked during maintenance and sign of no switch on should be tagged to avoid any risks.
- 6.Cleaning the compressor and components with non-corrosive solvent.
- 7.Before any maintenance, repair work, adjustment or any other non-routine checks:
 - 7.1 Stop the machine until it is cooled down.
 - 7.2 Switch off the voltage,make sure all power supply is cut off.
 - 7.3 Depressurized the machine
- 8.The safety valve and shutdown protection system must be inspected regularly to ensure its sensitivity and reliability.- Generally,inspection should be performed once a year
- 9.Fire extinguishers should be available near the unit.

2 FREQUENCY INVERTER PRECAUTIONS

1. Do not touch the cooling fins and transformers in the hot state. Otherwise, you may get burned.
2. Do not change the factory-set parameters of the inverter arbitrarily. Improper changes will damage the inverter.
3. Do not touch the terminals of the frequency converter, they carry high voltage. Touching it may result in electric shock.
4. Before inspection or maintenance, the main power circuit must be cut off, and the charging indicator light must be off. It is dangerous to carry out any work when there is residual voltage on the capacitors of the frequency converter.
5. Only qualified personnel can inspect, repair or replace parts. All metal objects (such as watches, bracelets, etc.) must be removed in advance, and the tools used must have insulating functions to avoid electric shock.
6. The inverter is equipped with a DC reactor. When there are radios or other electronic devices nearby, install a filter on the input power side.
7. Failure to follow these rules may cause electric shock

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CHAPTER 1 GENERAL RULES AND SPECIFICATION OF S CREW AIR COMPRESSOR

1.INTRODUCTION

The oil-injected screw air compressor has the features of reliable performance, few wearing parts, low vibration, low noise and high efficiency.

During the compression process, the compressor continuously sprays lubricating oil into the chamber and bearings by the pressure difference generated by compressor itself. The lubricating oil has 4 main functions:

1.1. Lubrication: Lubricating oil can form an oil film on the surface of rotors. It can avoid the contact between rotors and reduce the friction.

1.2. Sealing effect: The oil film produced by lubricating oil can seal the compressed air and improve the volumetric efficiency of the compressor.

1.3. Cooling effect: Since the lubricating oil absorbs a large amount of compression heat, the compression process is close to isothermal compression, which reduces the Specific power.

1.4. Environmental protection: lubricating oil can reduce the noise generated by high-frequency compression.

2. STRUCTURE

2.1. Basic structure

The oil-injected screw compressor used by our company is a two-shaft positive displacement rotary compressor. The air inlet is opened at the upper end of the casing, the exhaust port is opened at the lower part, and a pair of high-precision main (male) and auxiliary (female) rotors. Then it is installed horizontally and parallel inside the casing, the main (male) rotor has five shaped teeth, and the secondary (female) rotor has six shaped teeth. The main rotor has a larger diameter and the auxiliary rotor has a smaller diameter. The teeth form a helical shape and surround the outer edge of the rotor, and the teeth shapes of the two mesh with each other. The two ends of the main and auxiliary rotors are respectively supported by bearings, with one roller bearing at the intake end and two symmetrically installed tapered roller bearings at the exhaust end. The body is divided into two types, one is the belt drive type, and the other is the direct drive type. The direct drive system uses a coupling to combine the motor with the air end, and then increases the main rotor speed through a set of high-precision gears box. The belt drive type has no speed-up gears, and the power is transmitted through the belt by two pulleys made according to the speed ratio.

2.2. Engagement

The motor drives the main rotor through the coupling, gear or belt. Because the two rotors mesh with each other, the main rotor directly drives the auxiliary rotor to rotate together. The cooling lubricating oil is directly sprayed into the meshing part between the rotors through the nozzle at the lower part of the compressor casing, and mixed with the air to take away the heat generated by the compressor to achieve the cooling effect. At the same time, an oil film is formed to prevent direct metal-to-metal contact between the rotors and to close the gap between the rotors and the rotor and the casing. The injected lubricant also reduces the noise caused by high speed compression. Due to the difference in exhaust pressure, the weight of the fuel injection is about 5-10 times the weight of the air.

3. WORKING PRINCIPLE

3.1. Suction process :

The suction port on the intake side of the screw type must be designed so that the compression chamber can fully absorb air, while the screw type compressor does not have an intake and exhaust valve group, and the intake air is only regulated by opening and closing a regulating valve. When the rotor rotates, the tooth groove space of the main and auxiliary rotors is the largest when it turns to the opening of the intake end wall. At this time, the tooth groove space of the rotor is the same as the free air in the air inlet, because the air in the tooth groove is exhausted during exhaust. When the exhaust is completed, the tooth groove is in a vacuum state. When it is turned to the air inlet, the outside air is sucked in and flows into the tooth groove of the main and auxiliary rotors along the axial direction. When the air fills the entire tooth groove, the end surface of the intake side of the rotor turns away from the air inlet of the casing, and the air between the tooth grooves is sealed, the above is [intake process].

3.2. Sealing and delivery process :

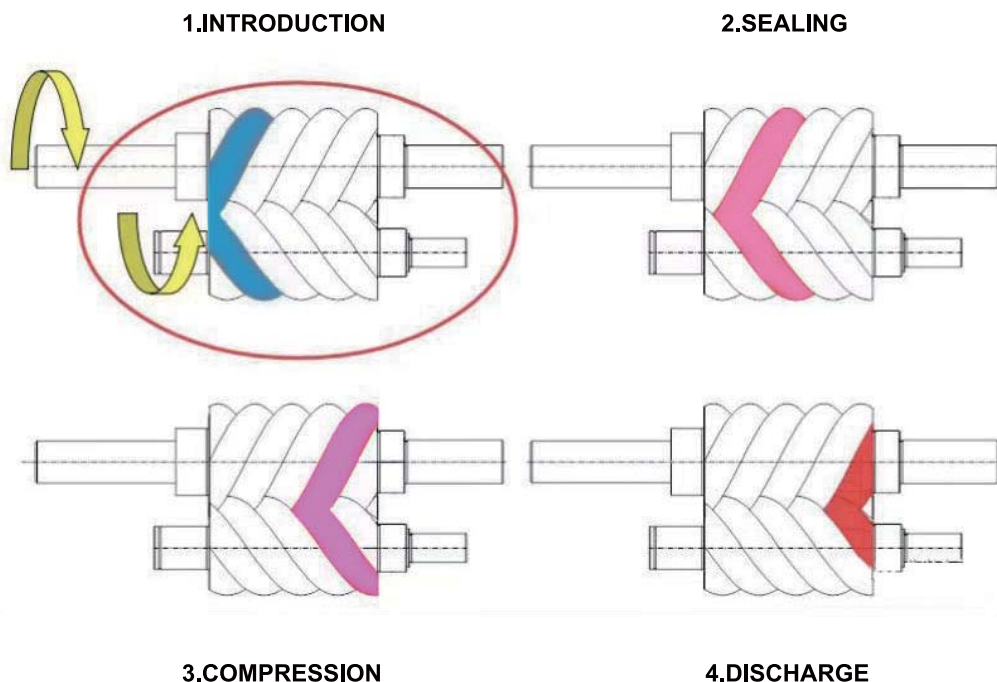
When the main and auxiliary rotors are inhaled, the tooth peaks of the main and auxiliary rotors are closed with the casing, and the air is closed in the tooth grooves and no longer flows out, that is, [the sealing process]. The two rotors continue to rotate, and the tooth crests and tooth grooves match at the suction end, and the matching surfaces gradually move toward the exhaust end. This is the [delivery process].

3.3. Compression and oil injection process :

During the delivery process, the meshing surface gradually moves toward to the exhaust end, that is, the tooth groove space between the meshing surface and the exhaust port gradually decreases, the gas in the tooth groove is gradually compressed, and the pressure increases, which is the [compression process]. While compressing, lubricating oil is also sprayed into the compression chamber to mix with air due to the pressure difference.

3.4. Discharge process:

When the meshing end surface of the rotor turns to communicate with the exhaust port of the casing, (the pressure of the compressed gas is the highest at this time), the compressed gas starts to be discharged until the meshing surface of the tooth crest and the tooth groove moves to the exhaust end surface. At this time, the two The tooth groove space between the meshing surface of the rotor and the exhaust port of the casing is zero, and the [exhaust process] is completed. At the same time, the length of the tooth groove between the meshing surface of the rotor and the air inlet of the casing reaches the longest. The exhalation process is going on again.

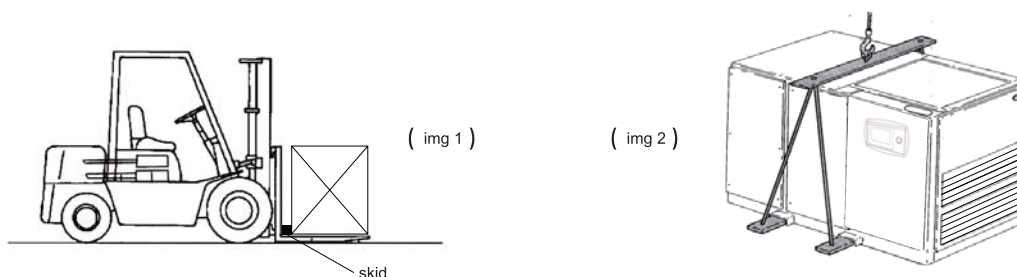


CHAPTER 2 RECEIVING GOODS AND INSTALLATION

1. RECEIPT AND INSTALLATION

1. Transportation

The transportation and installation of the unit must be carried out strictly in accordance with the relevant handling precautions. When forklifting, the upper wood should be placed to prevent the forklift from crushing the door panel of the unit (see Figure 1). If you use a sling, you must use a cross bar, which can offset the slings create side pressure against the box (see Figure 2). Attention! It is not advisable to only put some protective material between the sling and the sound insulation cover of the unit, as it will crush the door panels on both sides above the unit.



2. Foundation aspects

1. The foundation should be built on a hard floor, and the foundation plane must be leveled before installation to avoid noise caused by vibration of the compressor.

2. If the compressor is installed upstairs, anti-vibration treatment must be done to prevent the vibration from being transmitted to the downstairs or cause resonance, which will pose a safety hazard to the compressor and the building itself.

3. The vibration generated by the screw compressor is small, so it is not necessary to make a fixed foundation. But the ground where it is placed must be flat, and the ground cannot be soft soil; if possible, it is better to lay a 5~10mm cushion on the bottom of the unit.

3. Receipt and installation

(1) Receipt

1.1. When you receive the air compressor, please check the quantity, type, specification and accompanying information according to the items listed in the packing list.

1.2. Visually check whether the air compressor and its accessories are damaged during transportation.

1.3 If there is a shortage or damage, please indicate the situation and notify the related person to deal with it.

(2) Selection of installation site:

The selection of the installation place of the air compressor is most neglected by the staff. Often after the air compressor is purchased, you just find a random location and use it immediately after piping. There is no prior planning at all, that will result in future air compressor failures, difficult maintenance, and unqualified compressed air. Therefore, a proper installation site is a prerequisite for the correct use of the air compressor system.

2.1. It must be a wide and well-lit place to make it easy for operation and maintenance.

2.2. The relative humidity of the air should be low, with little dust, clean air and good ventilation.

2.3. The ambient temperature must be lower than 40°C, because the higher the ambient temperature, the smaller the output air volume of the air compressor.

2.4. If the factory environment is bad and with a lot of dust, pre-filter equipment must be installed to maintain the service life of the air compressor system parts.

2.5. Reserve passages and install cranes (especially needed for high-power air compressors) to facilitate maintenance.

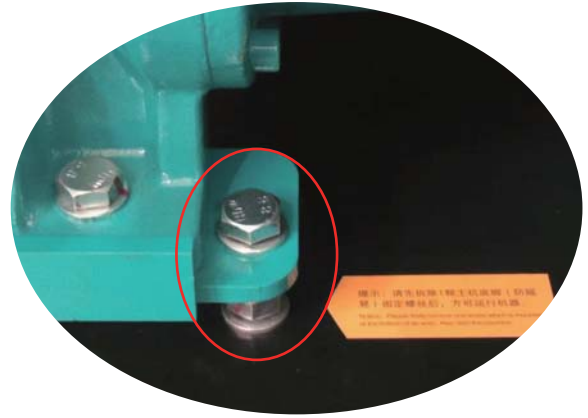
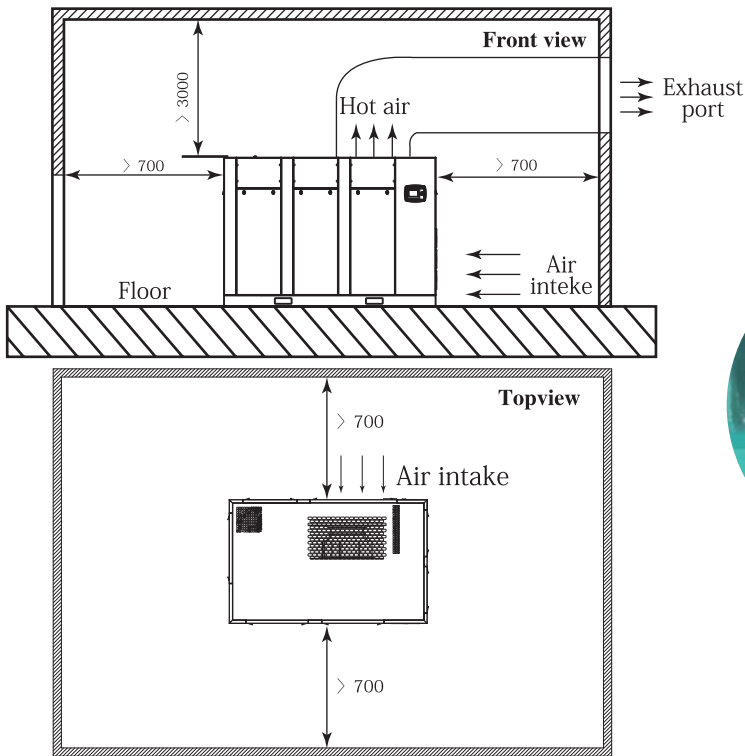
2.6. Reserve space for maintenance. There must be a distance of at least 70 cm between the air compressor and the wall.

2.7. If the air compressor is placed in a closed room, an exhaust fan must be installed to maintain the temperature in the machine room.

The air volume of exhaust fan must be greater than the air volume of the circulating fan or cooling fan equipped in air compressor, and the inlet area of the cold air must be sufficient. It is also possible to install a guide at the outlet to guide the hot air from the guide channel to the outside to maintain room temperature.

(3) Remove the fixing screw at the base

Before starting the machine, the one fixing screw must be removed (see Figure 3)



(img 3)

Air-cooled compressor installation guide(Ref.)

2.PRECAUTIONS FOR PIPING,FOUNDATION AND COOLING SYSTEM

1.1. Precautions for piping of air pipeline

- ① When piping in the main pipeline, the pipeline must have an inclination of 1~2 to facilitate the discharge of condensed water in the pipeline.
- ② The pressure drop of the piping line shall not exceed 5% of the set pressure value of the air compressor, so it is best to choose a pipe diameter larger than the design value when piping.
- ③ The branch pipeline must be connected from the top of the main pipe to prevent the condensed water in the pipeline from flowing down into the working machine or back into the air compressor.
- ④ The tools that need to be lubricated should be combined in three combinations (air filter, pressure regulator, oiler) to maintain the service life of the tool.
- ⑤ Do not shrink the main pipe arbitrarily. If necessary, reduce or enlarge the pipe must use reducer, otherwise there will be mixed flow at the joint.
It will lead to a large pressure loss and have a great impact on the life of the pipeline.
- ⑥ If there are purification and buffer facilities such as air storage tank and dryer after the air compressor, the ideal piping should be air compressor + air storage tank + dryer. In this way, the air storage tank can filter out part of the condensed water, and the air storage tank also has the function of reducing the exhaust temperature of the gas. Low temperature and moisture content
Less air is entering the dryer, reducing the load on the dryer.
- ⑦ If the air volume of the system is large and the time is short, it is best to install an air storage

tank as a buffer, which can reduce the empty load of the air compressor
The number of times is of great benefit to the air compressor oil.

⑧ For compressed air whose system pressure is below 15Mpa, the flow rate in the delivery pipe must be below 15m/sec to avoid excessive pressure drop.

⑨ Minimize the use of elbows and various valves in the pipeline to reduce pressure loss.

⑩ The ideal piping is that the main line surrounds the entire factory building, so that two-way compressed air can be obtained at any position. If used in a branch line
When the gas volume suddenly increases, the pressure drop can be reduced. And arrange appropriate valves on the ring-shaped main line to facilitate maintenance and cut-off.

1.2.Foundation

① The foundation should be built on hard soil, and the foundation surface must be leveled before installation to avoid vibration from the air compressor.

② If the air compressor is installed upstairs, anti-vibration treatment must be done to prevent the vibration from being transmitted to the buckle, or to cause resonance, which is harmful to the air compressor and the building itself.

③ The vibration generated by the screw air compressor is very small, so no foundation is required. But the ground where it is placed must be flat, and the ground cannot be soft soil.

3.GENERAL SPECIFICATIONS AND SAFETY SPECIFICATIONS FOR ELECTRICAL APPLIANCE

1. According to the power of the air compressor to be used, choose the correct diameter of the power supply wire. Do not use a wire diameter that is too small, otherwise the power cord may be burned due to high temperature and cause danger.

2. It is best to use a independent power system for the air compressor, especially to avoid parallel use with other different power consumption systems. If used in parallel, the air compressor may be overloaded due to excessive voltage drop or unbalanced three-phase current. If the protective device trips, the high-power air compressor must pay special attention to this.

3. Install appropriate NFB (no fuse switch) according to the KW of the air compressor to maintain the safety of the power usage system and maintenance.

4. When the air compressor is powered on, the correctness of the voltage must be confirmed.

5. The grounding wire of the motor or the system should be properly erected, and the grounding wire cannot be directly connected to the air delivery pipe or the cooling water pipe.

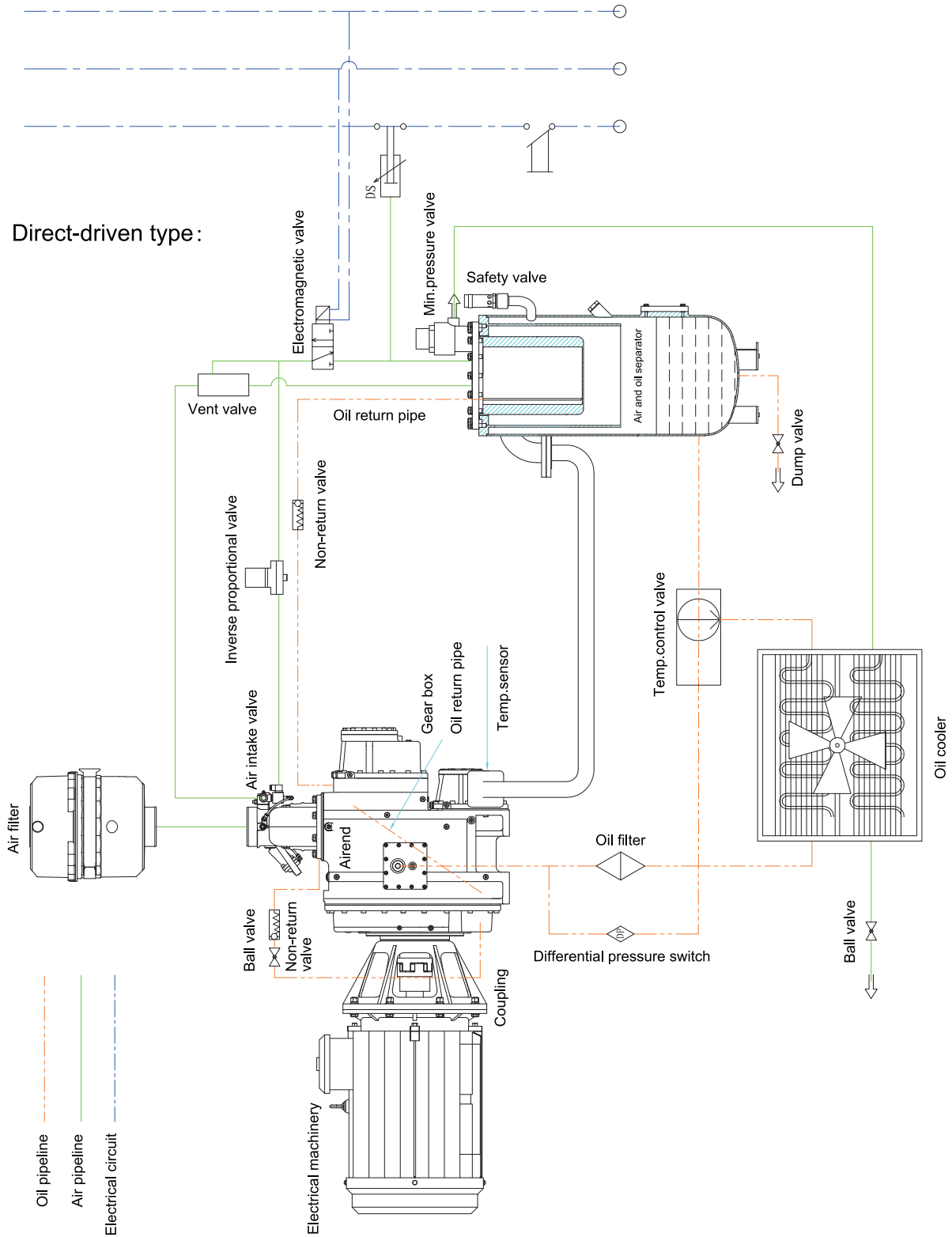
6. Generally, when a three-phase AC motor is overloaded, the current shall not exceed 3% of the rated current. If the three-phase current is unbalanced, the ratio of the lowest current to the highest one shall not exceed 5%. At the same time, if there is a voltage drop, the The voltage drop shall not be lower than 5% of the stable voltage.

7. The air compressor must pull a ground wire to the ground to prevent danger caused by leakage.

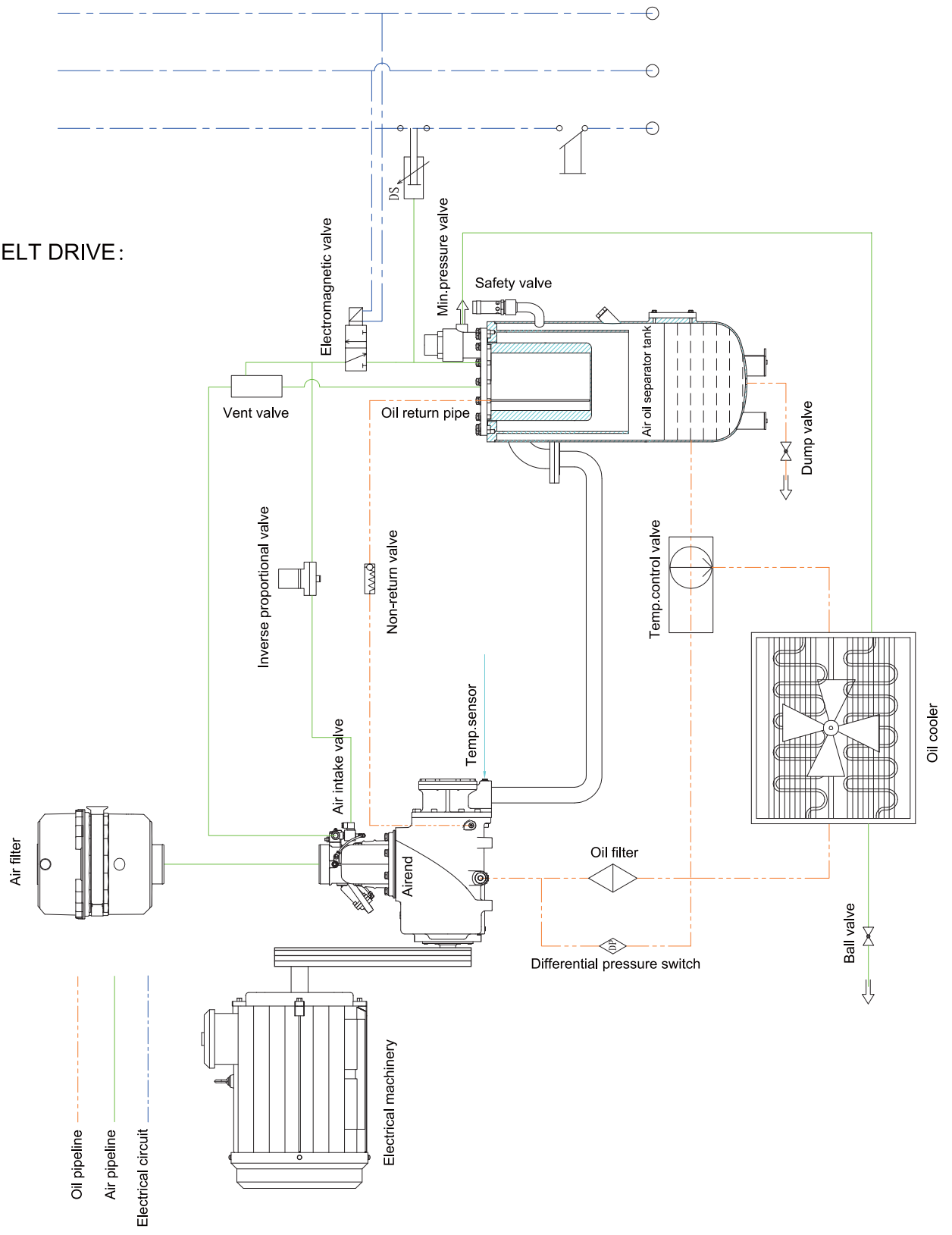
CHAPTER 3 WORKING PROCESS DRAWING

1. DRAWING OF WORKING PROCESS

Direct-driven type:



BELT DRIVE :



2. SYSTEM FLOW

2.1. Air flow (refer to the system flow chart of each model)

① After the air is filtered by the air filter to remove dust, it enters the main compression chamber through the intake valve and is compressed; it is mixed with lubricating oil, The combined compressed air enters the oil and gas barrel through the exhaust check valve, and then is sent to the use system through the pressure maintaining valve of the oil and gas separator and the rear cooler.

② Function description of each component in the main air source passage:

A. Air filter

The air filter is a thousand-type paper filter. The filter paper has a pore size of about 10 μ . Usually, it should be removed every 1000 hours to remove the dust on the surface. The cleaning method is to use low-pressure air to blow the dust from the inside to the outside. This means the air filter must be cleaned or replaced.

B. Suction Valve

Empty load control:

This kind of intake valve system adopts piston control, and uses the up and down movement of the piston to control the empty and heavy loads. When starting, stopping or idling, the action of the solenoid valve is used to control the intake valve piston to close the valve upwards, and the throttle valve is also used to set the minimum pressure required for the system cycle.

When the motor is running at full load, the solenoid valve is energized to stop the discharge. At this time, the piston of the intake valve is sucked downward due to the difference in intake pressure to enter the intake state. If the pressure reaches the upper limit value of the pressure switch, the solenoid valve of the pressure switch starts to release, and pushes the piston of the intake valve upward to close the valve, and becomes an empty-load state.

a. Volume adjustment control: When the system pressure gradually rises (below the set value of the pressure switch), it first reaches the set pressure of the volume adjustment valve, and a little air will pass through, pushing the intake valve piston upwards, and The amount of the intake valve will gradually decrease; at this time, the system has begun to adjust capacity. If the pressure continues to rise, the intake piston will be closed upwards, and on the contrary, if the system pressure decreases, the intake piston will open and the intake air volume will increase. Until it is lower than the setting value of the capacity regulating valve, the capacity regulating action will stop.

b. Guide rod capacity control valve: There are two brakes on the intake valve, the left one is the intake brake. On the right is the capacity adjustment brake. When the load is heavy, the pressure from the solenoid valve enters the left air cylinder. Pressure from the solenoid valve enters the left cylinder due to the difference in valve load due to the area exposed to the pressure. Due to the difference in the area exposed to pressure, the valve stem is pushed to the right, at which point the intake valves open for heavy duty operation.

The system pressure has a pipe connected to the inlet of the pressure control valve on the right through the pressure regulating valve, and then enters the volume regulating control room. When the system pressure rises due to the reduction in usage and reaches the set pressure adjusted by the volume control valve, the pressure begins to enter the volume control room. There is a discharge hole in the volume control room. If the air intake is greater than the discharge volume At this time, the pressure is gradually built up in the capacity adjustment control chamber, and the diaphragm is pushed to the left under pressure to push the valve stem to the left through the push bolt to limit the intake air volume. If the system usage increases at this time, the system pressure will drop slightly, and the capacity control valve will be closed or closed down, and the pressure source reduction work of the capacity control room will be cut off. The original pressure is reduced or disappeared by the release. The thrust force on the left side of the diaphragm also decreases, and the valve stem can be pushed to the right side to increase the intake air volume. This is the process of capacity adjustment.

If the usage of the system is reduced a lot, the speed of pressure rise exceeds the response capacity of capacity adjustment. Then the pressure switch action is about to de-energize the solenoid valve, and the left air intake brake chamber loses pressure, and the valve stem is pushed back to the closed position by the spring to cut off the air intake. At the same time, the air in the oil and gas barrel is discharged to the air inlet through the discharge valve, and the main engine is in no-load operation. When the system pressure drops below the preset limit, the solenoid valve excitation recovery load procedure is repeated.

③ Temperature sensor

In condition of water loss, oil loss, insufficient water, insufficient oil, etc. They all can lead the high temperature of exhaust air. When the exhaust temperature reaches the temperature value set by the temperature switch, the main controller will act and stop the machine. The temperature is generally set at 100°C, and it is attached with a thermometer and instrument panel, which can read the temperature of the exhaust branch.

④ Non-return valve

It can prevent the compressed air in the oil and gas barrel from flowing back into the body during shutdown, causing the rotor to reverse.

It can eliminate the internal stress of pipeline expansion and the vibration of the unit caused by heat.

⑤ Oil and gas tank

There is an oil mark on the side of the oil and gas barrel. The oil level of the static lubricating oil should be between the high oil level line of the oil level gauge. There is a filling hole on the barrel for refueling. There is an oil drain valve under the oil barrel, and the oil drain valve should be slightly opened before each start to remove the condensed water in the oil and gas barrel.

Due to the large cross-sectional area of the oil drum, the compressed air can reduce the flow rate and separate the oil droplets, which is the first stage of degreasing.

⑥ Oil and gas separator

For details, refer to the instructions in the next section.

⑦ Safety valve

When the pressure switch is improperly adjusted or malfunctions so that the pressure in the oil and gas barrel is higher than the set discharge pressure by 0.1Mpa, the safety valve will jump open and the pressure will drop below the set discharge pressure. The safety valve has been adjusted before leaving the factory, please do not touch it at will.

⑧ Relief Solenoid Valve

The discharge valve is two normally open solenoid valves. When the machine is stopped or unloaded, the valve is opened to discharge the pressure in the bucket to ensure that the compressor can start without load or run without load.

⑨ Minimum pressure Valve

Located at the outlet of the fine oil separator above the oil and gas barrel, the opening pressure is set at about 0.45Mpa. The functions of minimum pressure valve are: A. Prioritize the establishment of the circulation pressure required by the lubricating oil at startup to ensure the lubrication of the machine body.

B. Open only after the pressure exceeds 0.45Mpa, which can reduce the air flow through the fine separator. In addition to ensuring the effect of the oil separator, it can also protect the oil and fine separator from damage due to excessive pressure difference.

⑩ After Cooler

A. If it is an air-cooled cooler, the cooling fan blows cold air through the cooler to cool the compressed air, and the exhaust temperature is generally below the ambient temperature +15°C. Air-cooled air compressors are sensitive to ambient temperature conditions. When choosing a location, it is best to pay attention to the ventilation conditions of the environment.

B. If it is a water-cooled model, use a shell-and-tube cooler and use cooler water to cool the compressed air. The exhaust temperature is below 40°C (the temperature of the cooling water inlet should not exceed 35°C). Water-cooled air compressors are less sensitive to ambient temperature conditions, and it is easier to control the discharge temperature. If the cooling water quality is too poor, the cooler is prone to fouling and blockage, so special attention must be paid. In addition, if the pH value of the water is very low (that is, the acidity is high), it must be corroded with a special copper material on one side.

2.2. Lubricating oil process (refer to the series flow chart of each model)

① Description of fuel injection process

Due to the pressure in the oil and gas barrel, the lubricating oil is pressed into the oil cooler. After the lubricating oil is cooled in the cooler, the impurity particles are removed through the oil filter, and then divided into two paths. One path is sprayed into the compression chamber at the lower end of the collective to cool the compressed air.

The compressed air mixed with oil enters the oil and gas barrel through exhaust, and a large part of the oil is separated, and the rest of the oil mist air passes through the oil fine separator to filter out the remaining oil, and enters the rear cooler through the pressure maintenance valve to cool before being sent to the use system.

② Control of oil injection quantity

The oil injected into the oil-injected screw compressor is mainly used to take away the heat generated by the air during the compression process, and the amount of oil injected directly affects the performance of the compressor. The fuel injection quantity has been set by our technicians before leaving the factory, so please do not touch it at will. If it needs to be adjusted due to the discharge temperature, please contact the service department of our company in advance to avoid damage to the air compressor.

③ Function of each component on the oil pipeline

A.Oil Cooler

The cooling method of the oil cooler is the same as that of the air aftercooler, and there are two cooling methods: air cooling and water cooling.

If the environmental conditions are not good, the fins of the air-cooled cooler are likely to be covered by dust, which will affect the cooling effect, and the exhaust temperature will be too high, causing the machine to trip. Therefore, use low-pressure compressed air to blow off the dust on the surface of the fins every certain period of time. If it cannot be blown off, it must be cleaned with a solvent. Be sure to keep the cooling surface of the cooler clean.

When the shell-and-tube cooler is blocked, it must be soaked in special chemical solution, and the scale blocked in the tube must be removed mechanically, and it must be completely cleaned.

B.Oil Filter

The oil filter is a kind of paper filter, its function is to remove impurities in the oil such as metal particles, oil deterioration, etc. The filtration accuracy is between $10\mu-15\mu$, and it has a perfect protection effect on the bearing and rotor. Whether the oil filter should be replaced can be judged by its differential pressure indicator light. If the differential pressure indicator light is on, it means that the oil filter is blocked and must be replaced. After the first 500 hours of operation of the new machine, the oil and oil filter need to be replaced, and then replaced according to the pressure difference indicator light. If the oil filter has a large pressure difference and is not replaced, it may lead to insufficient oil intake, and the high-temperature exhaust will trip the machine. At the same time, the lack of oil will affect the life of the bearing.

C. Oil Separator

The filter element of the oil-fine separator is made of multi-layer fine hibiscus glass fiber. The mist oil and gas contained in the compressed air can be almost completely filtered out after passing through the oil-fine separator. The oil quality of the lubricating oil and the pollution degree of the surrounding environment have a great impact on its life. If the environmental pollution is too serious, you can consider installing a front air filter. As for the choice of lubricating oil, you must use the brand recommended by our company, and it is best not to use fake oil. The outlet of the oil and fine separator is equipped with a safety valve, a relief valve and a pressure maintenance valve, from which the compressed air is led out to the cooler.

The oil filtered by the oil-fine separator is concentrated in the small circular groove in the center, and then returns to the inlet side of the body through an oil return pipe to prevent the filtered lubricating oil from being discharged with the air.

Generally speaking, whether the oil and fine separator is damaged can be judged by the following methods:

a. The oil contained in the air line increases.

b. There is an oil-fine separator pressure difference switch between the oil drum and the oil-fine separator to send out an alarm. The set pressure difference is 0.15Mpa.

c. Check whether the oil pressure is too high

d. Whether the current increases

D. Temperature control valve

A thermal control valve is installed in front of the oil cooler, its function is to maintain the exhaust gas temperature above the pressure dew point temperature. When starting the machine, the temperature of the lubricating oil is low. At this time, the thermal control valve will automatically open the return circuit, and the oil will enter the body without passing through the oil cooler. If the oil temperature rises above 71°C , the valve will open slowly, and fully open when it reaches 83°C . At this time, all the oil will pass through the oil cooler and enter the body.

2.3. Cooling system

① Air-cooled model

The cold air is sucked in by a circulating fan, blows through the heat dissipation fins of the cooler, and exchanges heat with compressed air and lubricating oil to achieve cooling effect. The maximum allowable ambient temperature of this cooling system is 40°C . If the ambient temperature exceeds 40°C , the system may trip, for example, it is placed next to a high-temperature boiler...etc.

② Water-cooled model

The water temperature design basis of the cooling water is 32°C, so special attention must be paid to the design of the cooling water circulation system. In particular, the quality of the cooling water must meet the general industrial water standards. Try to avoid the use of groundwater. If the water quality is poor, the cooling tower must regularly add cleaning agents to clean the deposits, so as not to affect the efficiency and life of the cooler. In winter, in areas where the normal cooling temperature is above the freezing point, after the unit stops, the cooling water in the cooler must be drained.

3.SAFETY PROTECTION SYSTEM AND WARNING DEVICE

1. Motor overload protection

There are two main motors in the air compressor system, one is the main motor driving the air compressor, and the other is the cooling fan motor. Under normal conditions, the operating current of the motor will not exceed 3% of the rated current (for example, due to voltage drop, three-phase unbalance... and other factors). When the operating current of the motor exceeds the limit set by the over-current protection device, the over-current protection device will automatically cut off the main power supply. The air compressor is stopped, and the air compressor cannot be started unless it is reset. Reasons for general motor overload:

① Man-made operation errors: such as self-adjustment of exhaust pressure, improper adjustment of the system...etc.

② Mechanical failure:

Such as motor content loss, motor out-of-phase operation, safety valve inaction, system setting failure, oil-fine separator blockage...etc.

If the motor is found to be overloaded during operation, immediately contact the manufacturer. Send someone to check and really find out the cause, otherwise the loss outweighs the gain if the motor burns out.

2. Excessive exhaust temperature protection

The maximum exhaust temperature set by the system is 105°C. If it exceeds 105°C, the system will immediately alarm and cut off the power supply. Generally, there are many reasons for the high exhaust air temperature, but the most common reason is the failure of the oil cooler. If the cooling fins of the air-cooled oil cooler are blocked by dust, the cold air cannot pass through the cooler freely, and the temperature of the lubricating oil will gradually rise, resulting in high-temperature shutdown. Therefore, it is necessary to use low-pressure air to remove the dust on the cooling fins every once in a while. If the blockages on the fins cannot be blown off, it is best to clean them with cleaning fluid or solvent. Water-cooled air compressors generally trip due to high temperature due to the reduction of heat transfer efficiency due to the fouling of the cooling copper pipes. The maximum ambient temperature designed for the air compressor is 40°C. If the ambient temperature is higher, the exhaust temperature will be higher. Therefore, it is necessary to choose a place with a low ambient temperature and good ventilation to place the air compressor.

When the exhaust air temperature exceeds the set value, the system start circuit is cut off, and the system cannot be started again at this time unless it is reset once.

3.Warning for low exhaust temperature:

① If you selected a model which is with too much air flow than you need ,the exhaust temperature will not be able to reach 80°C for a long time.This will cause condensation and metal rusted.So it's import to select a right model to ensure the machine running between temp.80°C -90°C .

② Machine can't be shut down if the oil temp.hasn't reach 80°C ,or it will cause the condensation and metal been rusted.

CONTROL 4 SYSTEM AND ELECTRICAL CIRCUIT

4.1.Screw air compressor control system

① Motor start (step down or Y operation)

During this time, the intake valve is fully closed. The discharge valve is fully open and the solenoid valve is in the closed position. At this time, the intake side becomes a high vacuum, and the lubricating oil required for the compression chamber and bearings is ensured by the difference between the vacuum in the compression chamber and the atmospheric pressure in the oil drum.

Full pressure and dynamic rotation of the motor (full pressure or Δ operation)

② The motor rotates at full pressure (full pressure or Δ operation)

After the control is cut into full pressure operation; the solenoid valve is in the open state after being energized, the discharge valve is closed, the pressure in the air inlet tank gradually increases, and the intake valve gradually opens, so the pressure in the oil tank increases rapidly, so that the intake valve is fully opened, and the compressor starts to operate under load. When the pressure rises to 0.45Mpa, the pressure maintenance valve is fully opened and the air is output.

③ Heavy-load/no-load operation When the exhaust pressure reaches the upper limit set by the pressure switch, cut off the power supply, the solenoid valve is closed, so the intake valve is also closed, and at the same time, the discharge valve is fully opened to discharge the air in the oil tank to the atmosphere. At this time, the compressor operates under no-load condition, and the required lubricating oil pressure is guaranteed by the difference between vacuum and atmospheric pressure. When the pressure of the pipeline system drops to the lower limit of the pressure switch, the pressure switch is turned on again, the solenoid valve is opened again and the intake valve is also fully opened, and the discharge valve is closed at the same time, and the compressor runs again under load.

④ Shutdown

After pressing the stop OFF button, the solenoid valve is powered off and closed, and at the same time, the relief valve is fully opened to discharge the air in the oil drum to the atmosphere. When the pressure in the oil drum drops to a certain value, the motor stops.

⑤ Emergency stop

When the exhaust temperature exceeds 105°C or the overcurrent protection device of the motor is activated due to overload, the power supply will be cut off and the motor will stop immediately. At the same time, the solenoid valve and intake valve will also be closed, and the discharge valve will be fully opened. Only when the unit is in abnormal conditions during operation can the emergency stop button be pressed, otherwise the system will fail.

⑥ Automatic shutdown system (unloading for long time)

If the air volume used by the system decreases, the compressor keeps running under no-load conditions. If the no-load operation time exceeds the set time, the air compressor will automatically stop and the motor will stop running. When the air volume used by the system increases and the system pressure will decrease, the air compressor will automatically start to replenish the air volume. The setting limit is based on the principle that the number of starts of the motor per hour should not exceed twice.

4.2. VSD Screw air compressor control and protection system

When the user's gas consumption is small or the gas is temporarily stopped, the main intake valve of the intake valve is closed to make the compressor run under the condition of reloading and enter the unloading state, so as to achieve the purpose of energy saving. After the gas consumption recovers, the microcomputer controller opens the main intake valve of the intake valve again, and the compressor is turned into full-load operation, and the loading operation state is resumed. At the same time, the microcomputer controller also monitors the unit, and automatically shuts down when the unit is abnormal (such as click overload, exhaust over temperature, etc.), protecting the compressor from damage. There is a safety valve on the oil and gas cylinder. When the pressure in the oil and gas pipe exceeds the set value, the safety valve will automatically open; quickly release the air and pressure to ensure the safety of the unit. This machine has a perfect pressure relief function, so under normal circumstances, the safety valve will not be opened.

4.3. Electric circuit of screw air compressor

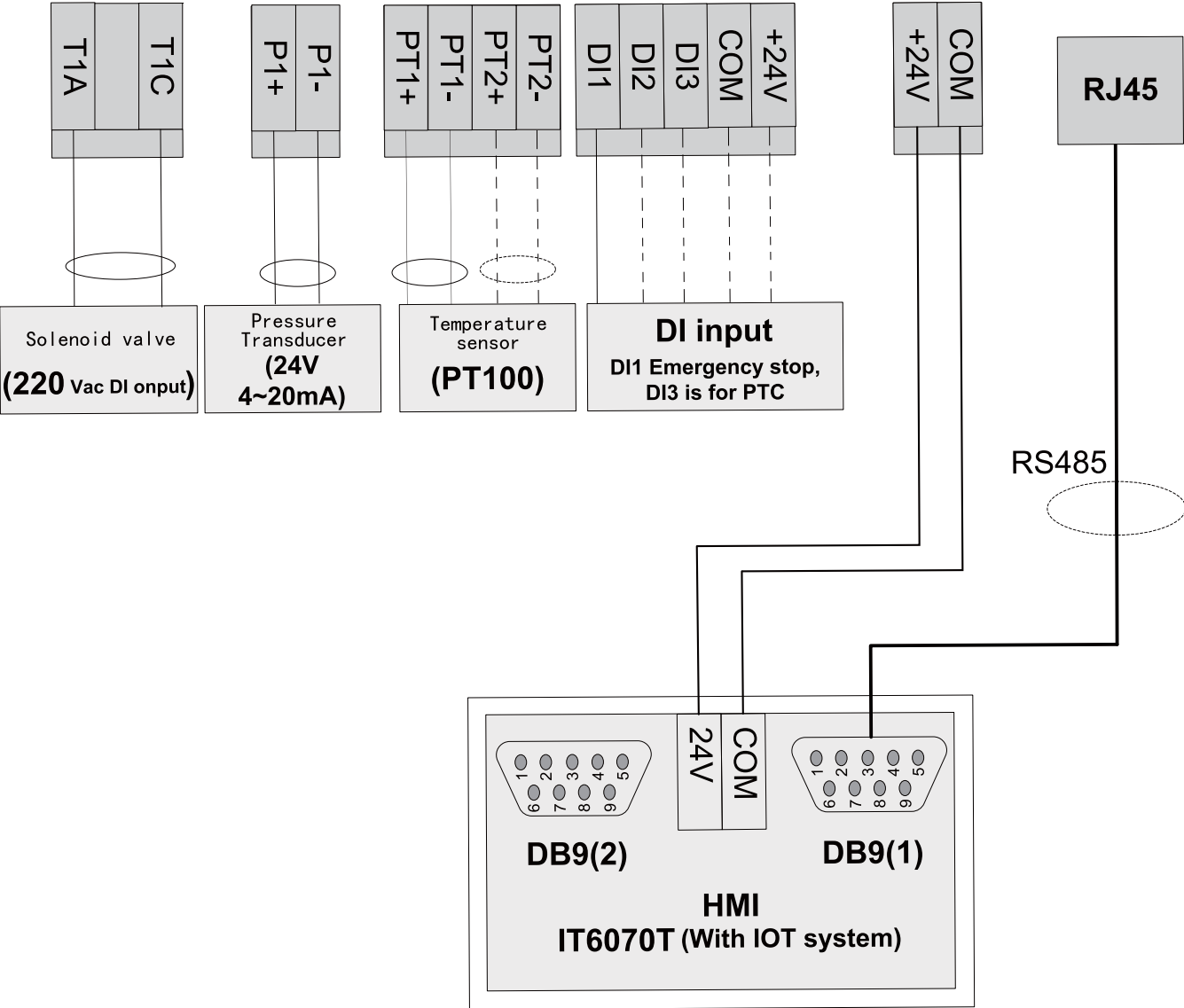
The electrical control of the air compressor can be composed of two systems, one is the internal control system, and the other is the part of the starting plate. The starting plate is the Y- Δ starting control commonly used in general machinery. The control part is electronically controlled. As the internal circuit and control of the electronic control part are relatively complicated, it will not be introduced in depth in this chapter. If there is any damage or failure, please contact the service unit of our company directly and replace the circuit board directly.

4.4. Electric circuit of variable frequency screw air compressor

The electrical system is composed of frequency converter, main motor, fan motor, electric control cabinet assembly, solenoid valve, temperature sensor, pressure transmitter, microcomputer controller and operation panel and other components. Refer to the User Manual for parameter setting and operation of the inverter compressor.

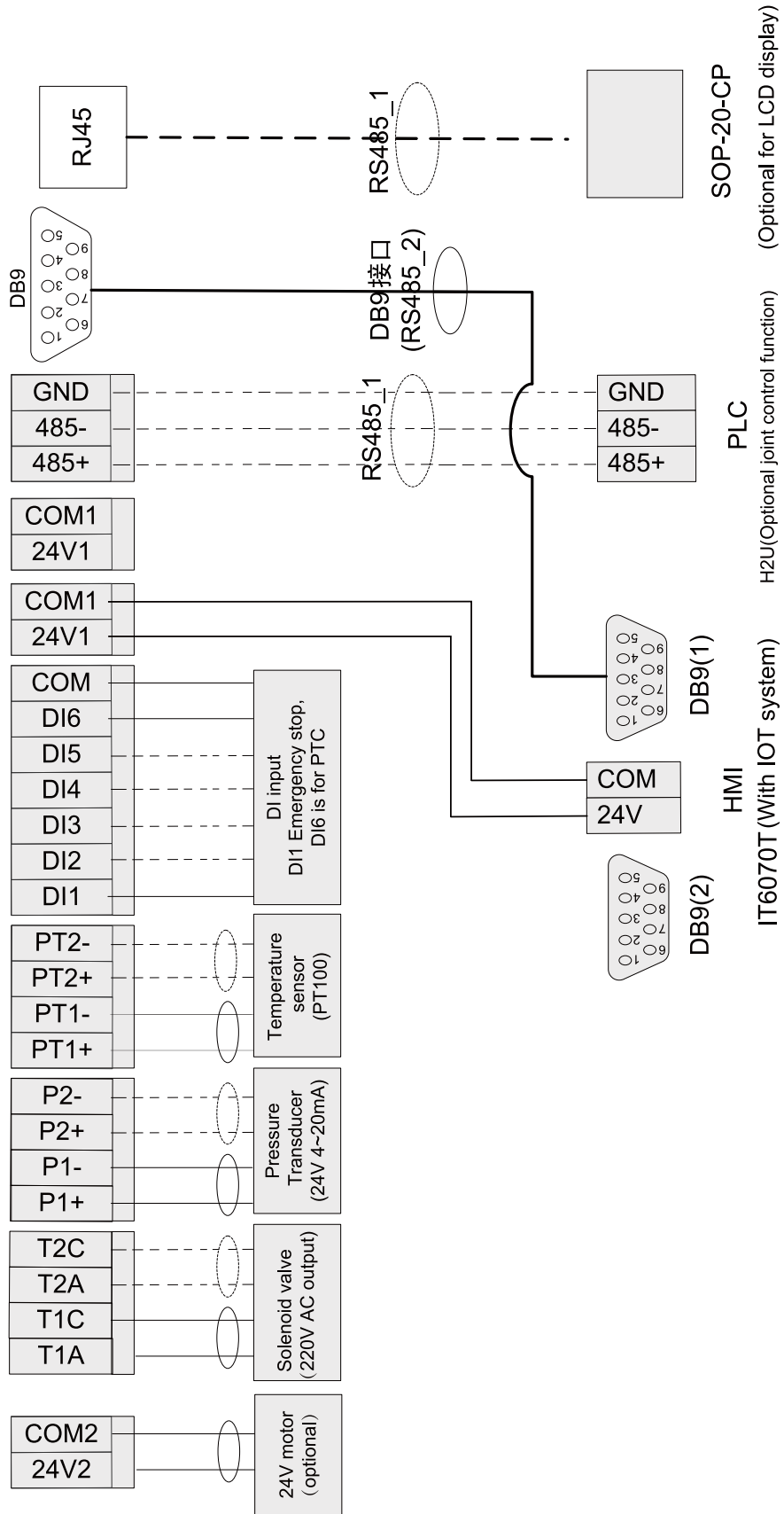
CP650 ELCTRICAL SCHEMATIC

(Suitable for TA/TG/TK/TE/TX/TB/TC Series ranging from 7.5–37kW)



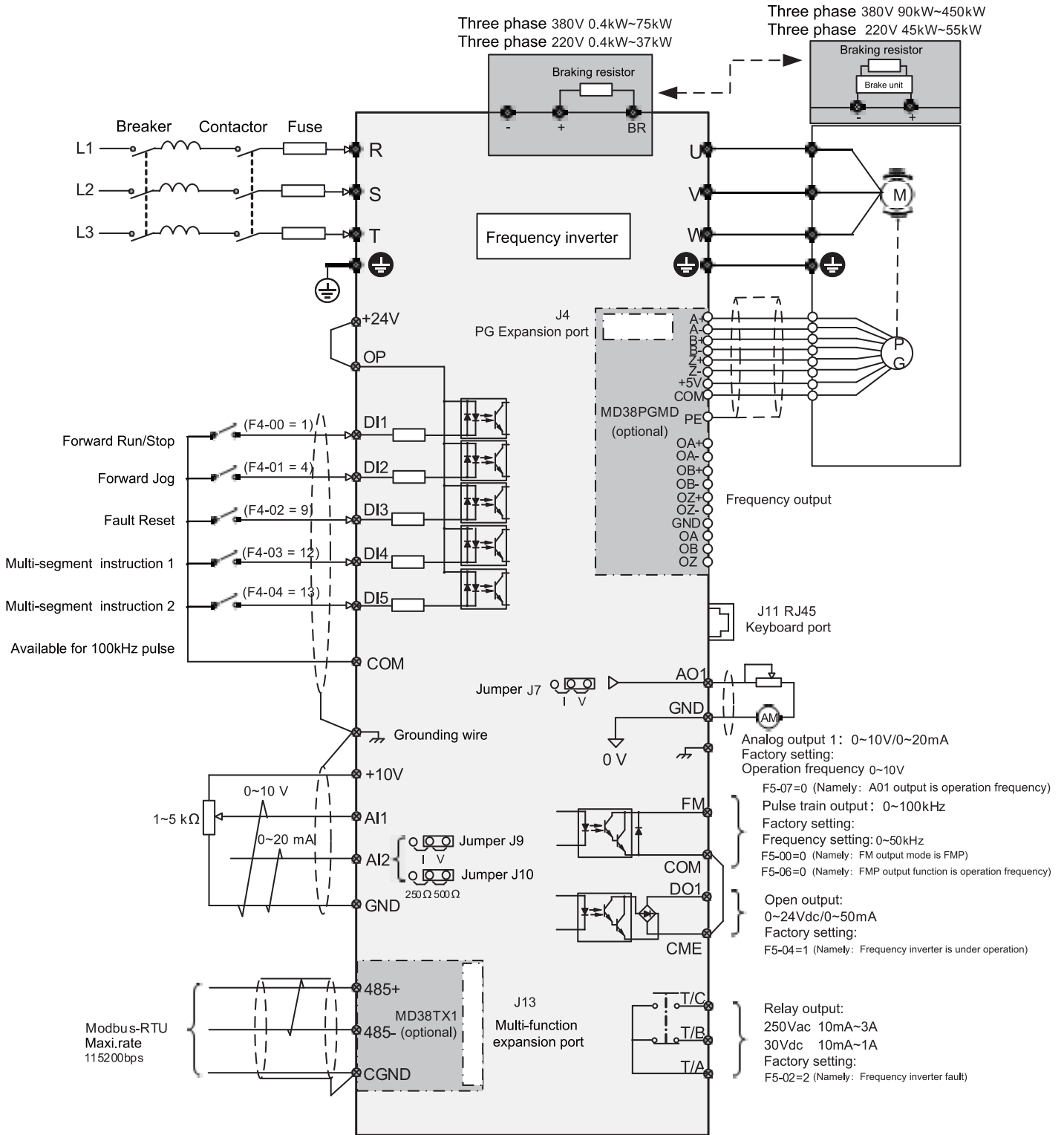
CP700 ELCTRICAL SCHEMATIC

(Suitable for TA/TG/TK/TE/TX/TB Series ranging from 45–90kW)



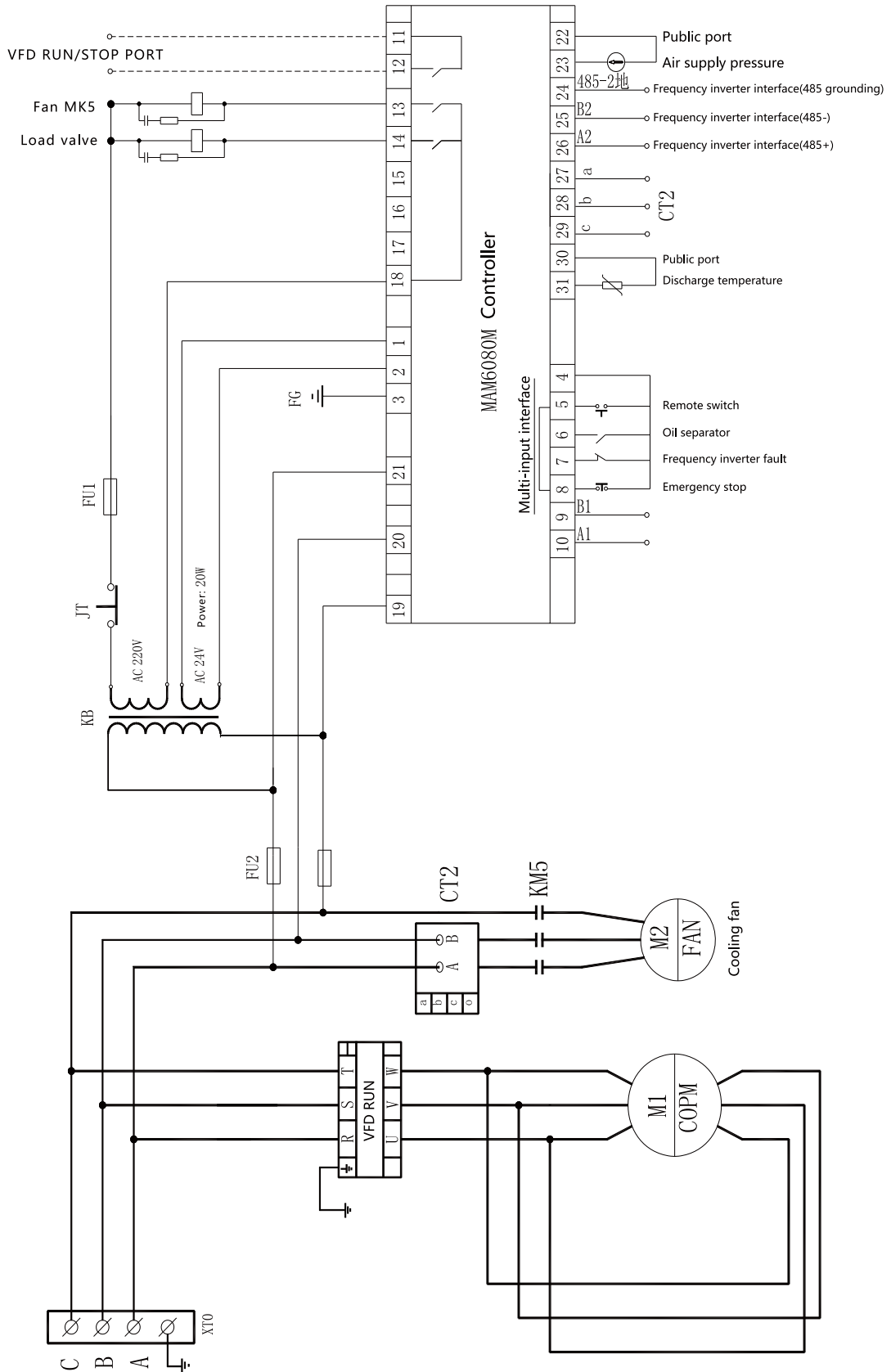
MD500E ELECTRICAL SCHEMATIC

(Suitable for TA/TG/TK/TE/TB Series ranging from 110~355kW)



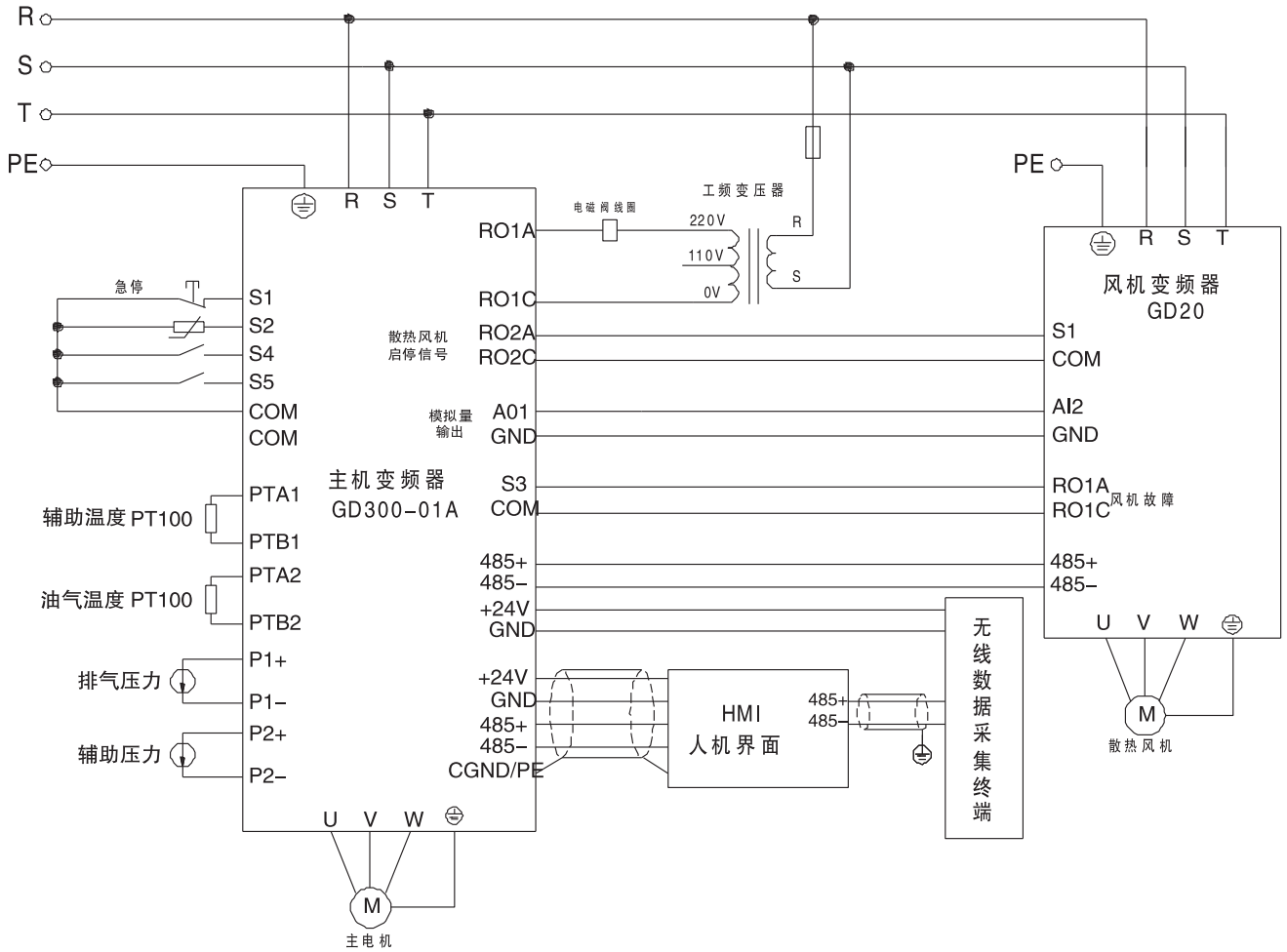
PLOT MAM6080M ELCTRICAL SCHEMATIC

(Suitable for TA/TG/TK/TE/TB Series ranging from 110–355kW)



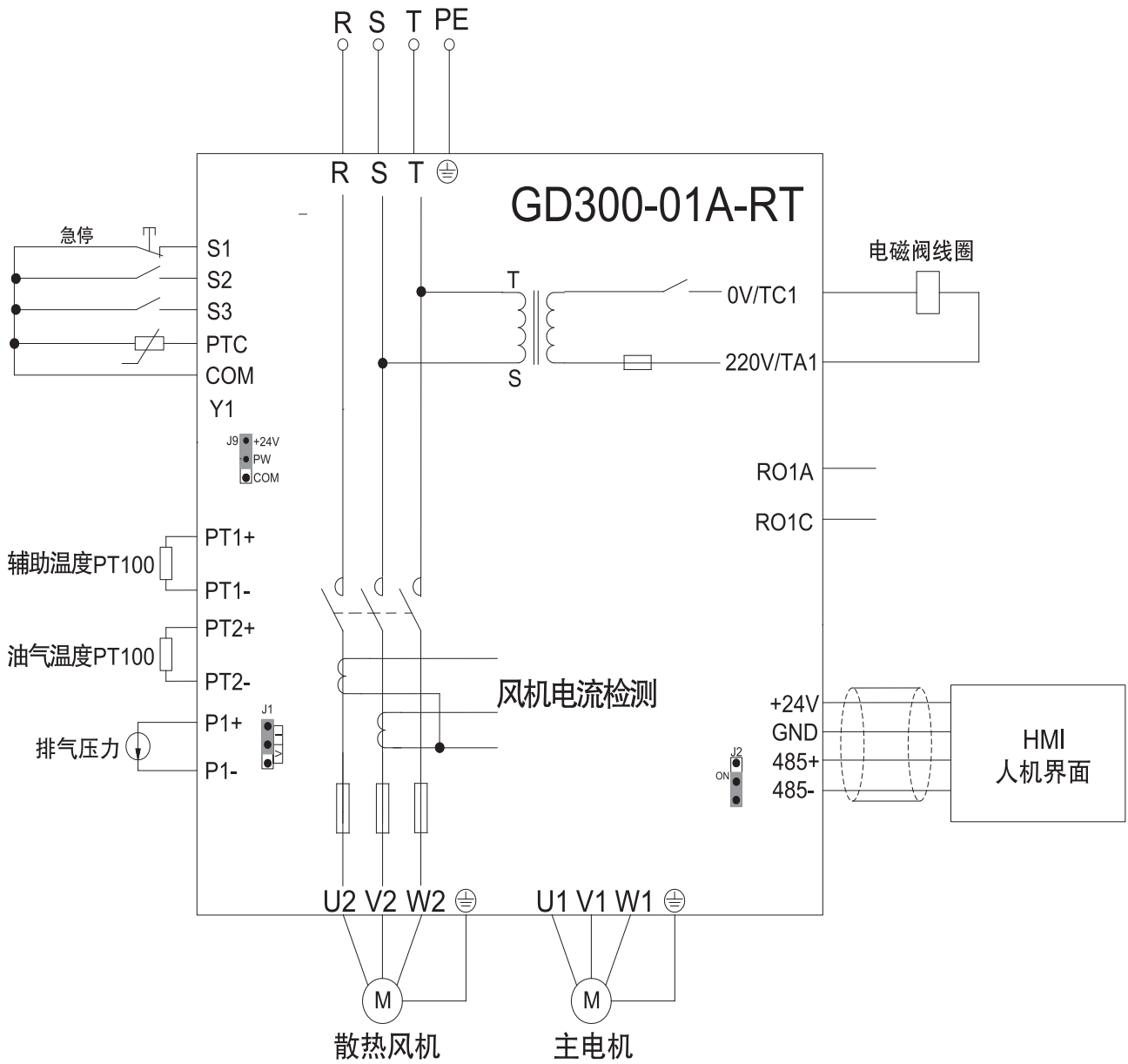
Goodrive300-01A 电气原理图

(适用于TA/TG/TK/TE/TX/TB/TC系列7.5~37KW机型)



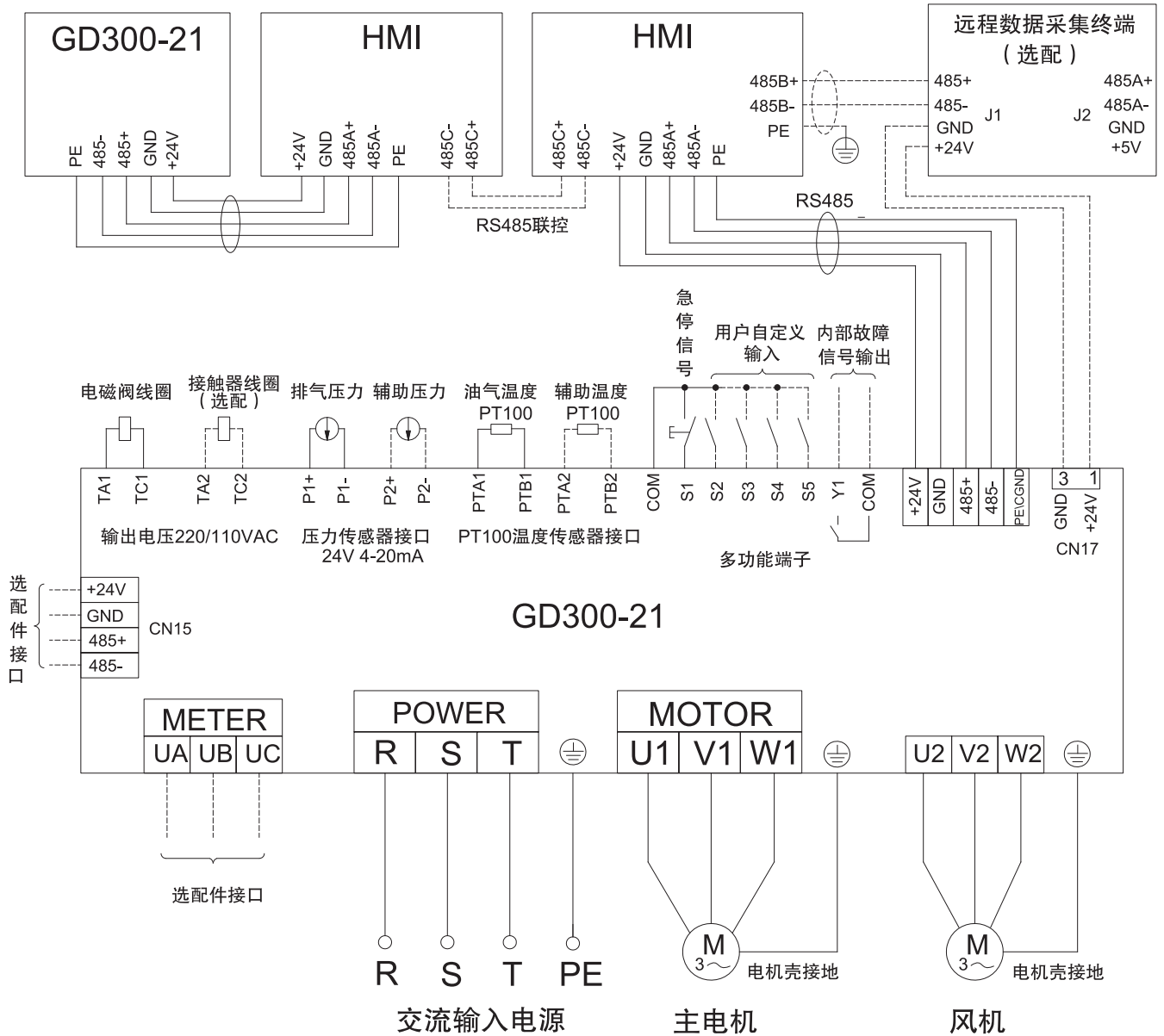
Goodrive300-01A-RT 电气原理图

(适用于TA/TG/TK/TE系列110~355KW机型)



Goodrive300-21 电气原理图

(适用于TA/TG/TK/TE系列45~90KW机型)



CHAPTER 5 OPERATION

1. TEST RUN, START-UP AND SHUTDOWN

- 1.1. Connect the power cord and grounding wire, and test whether the main voltage is correct and whether the three-phase power supply is correct.
- 1.2. Check whether the oil level in the oil barrel is between the upper oil level line H and the lower oil level line L.
- 1.3. If the delivery is long before the test run, you should add about 0.5 liters of lubricating oil from the intake valve, and turn the air compressor several times by hand to prevent oil loss and burning in the compressor when starting. Please pay special attention not to let clothes fall into the compressor body, so as not to damage the compressor body.
- 1.4. Check the cooling system.
- 1.5. Within a few seconds after pressing "ON" to start, press the "Emergency stop" button immediately to check whether the direction of rotation is correct. If the rotation direction is wrong, please exchange any two of the three wires.
- 1.6. Press the "ON" button again and the air compressor starts to run.
- 1.7. Observe whether the instruments and indicator lights are normal. If there are abnormal sounds, vibrations, or oil leakage, immediately press "emergency stop" to stop and check.
- 1.8. Pay attention to whether there are abnormal indications in each indicator light.
- 1.9. The exhaust temperature is kept between 75°C and 85°C.
- 1.10. 10-15 seconds after pressing the "OFF" button, the timing relay will act and the motor will stop. This is to prevent the air compressor from stopping directly under heavy load.
- 1.11. When the "OFF" button is pressed, the discharge valve will automatically exhaust.

2. INSPECTION BEFORE STARTING UP

Execution of inspection before starting up is necessary to avoid major failure of the compressor and improve the efficiency of use.

- 2.1. Open the air release valve of the oil and gas tank to remove the condensed water when the machine is shut down. If this work is ignored, the service life of the lubricating oil will be shortened, which may easily cause the bearing to burn.
- 2.2. Check whether the oil level is between H and L. The lubricating oil should not be too much or too little. If it is insufficient, it should be replenished. Carefully mix different brands of lubricating oil. When replenishing lubricating oil, make sure that there is no pressure in the system before opening the oil filler cap.
- 2.3. The oil level should be observed ten minutes after the shutdown. The oil level during operation may be slightly lower than the shutdown oil level.

3. ATTENTIONS DURING OPERATION

- 3.1. When there is abnormal sound and abnormal vibration during operation, stop the machine immediately.
- 3.2. There is pressure in the pipeline and container during operation. Do not loosen the pipeline or plug, and open unnecessary valves.
- 3.3. If there is no oil on the oil level gauge during long-term operation, and the oil level is too low indicator light is on, stop the machine immediately, observe the oil level after stopping for ten minutes, and add lubricating oil when there is no pressure inside the system if it is insufficient.
- 3.4. There will be condensed water in the rear cooler and cyclone separator, which should be drained regularly every day or installed with an automatic drain, otherwise the water will be brought into the system.
- 3.5. Check the meter every 2 hours during operation to record voltage, current, air pressure, exhaust temperature, oil level, etc., for future maintenance

4.TREATMENT OF LONG-TERM SHUTDOWN

When shutting down for a long time, the following methods should be carefully handled, especially in seasons or areas with high humidity.

4.1. Shutdown for more than 3 weeks

- ① Electrical equipment such as motor control panels should be wrapped with plastic paper or oiled paper to prevent moisture intrusion.
- ② Drain the water in the oil cooler and after cooler safely.
- ③ If there is any fault, it should be eliminated first for future use.
- ④ After a few days, drain the condensed water from the oil barrel, oil cooler and after cooler.

4.2. Shutdown for more than 2 months

In addition to the above procedures, the following processing is required:

- ① Close all doors to prevent moisture and dust from entering.
- ② Wrap the safety valve, control panel, etc. with oil paper or similar paper to prevent corrosion.
- ③ Replace the lubricating oil with new one before shutting down, and run it for 30 minutes. After two or three days, drain the oil drum and the condensed water in the cooler.
- ④ Drain the cooling water completely.
- ⑤ Move the machine to a dry place with less dust as much as possible.

4.3. Reboot procedure

- ① Put plastic paper or greased paper on the machine table.
- ② Measure the insulation of the motor and it should be above $1M/2$.
- ③ Other procedures are as described in the test run.

CHAPTER 6 MAINTENANCE AND INSPECTION

1.SPECIFICATION AND MAINTENANCE OF LUBRICATING OIL

1.1. Please use screw compressor special oil

1.2. Oil change step

- ① Run the Air compressor to raise the oil temperature to facilitate emissions. Then press the“OFF” button to stop the operation.
- ② Open the drain valve when there is pressure, the drain speed is very fast, but easy to spray, should be opened slowly, against the oil splash.
- ③ After the oil is drained, close the drain valve and open the filling cover to fill with new oil. Note that all oil in the system, such as pipes, coolers/oil drums, must be exhaustion.
- ④ Inject oil

1.3.Attention points when use lubricating oil.

- ① Do not let the oil exceed the service life of the oil, oil should be replaced on time, otherwise the oil products decline, poor lubricity, easy, caused by high temperature tripping, and because the oil of the ignition point drop, also easy to form oil spontaneous combustion and air compressor burned event.
- ② Air compressor in use after two years, the best oil to do once by the“System cleaning” work, the practice is when the replacement of new oil, let air compressor running 6-8 hours, immediately and replace the oil, so that the residual organic components in the original system can be cleaned, re-replacement of the oil can have a better service life.

Warning

In order to ensure machine run well, and to maintain your normal rights and interests, please use the screw compressor oil timely line consumables. Otherwise, the machine appears abnormal, you will not get the normal warranty service

2.REGULAR MAINTENANCE

REGULAR MAINTENANCE TABLE

Check Item	Every Day	Every Week	First time 500 hours / 2 months	Every 2000 hours / 6 months
Current/Temperature /Pressure Indication	●			
Compressor Special Oil	●		●	●
Oil & Gas Tank Discharge		●		
Cleaning Machine		●		
Cleaning Condenser				●
Air Filter Element				●
Oil Filter Element			●	●
Oil & Gas Separator Element			●	●
Frequency Inverter Louver intake filter screen			●	
Motor Grease				●

● Inspection and handling
 ● First replacement
 ● Must be replaced

Regular Parts list reference

Only for reference, please follow machine data bag << Regular parts list>>

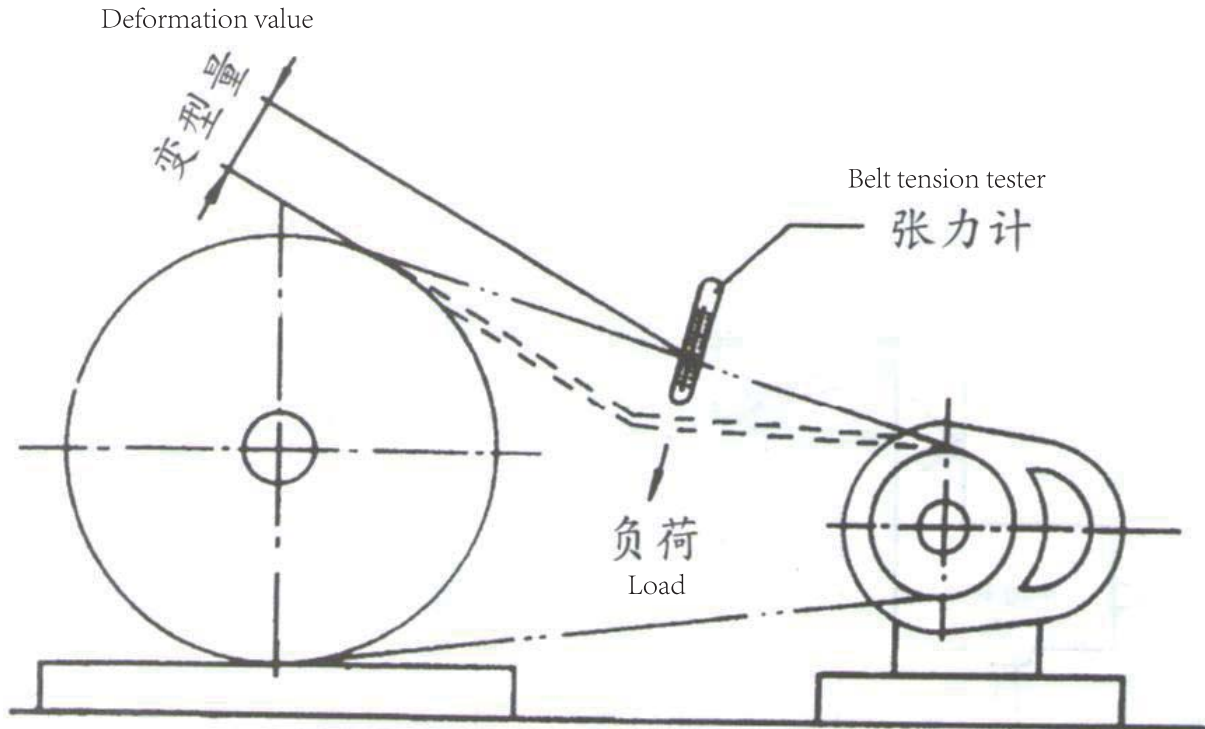
No.	Description	Necessary spare parts	Remark
1	Air filter	*	
2	Oil filter	*	
3	Oil and air separator element	*	
4	Cooling oil	*	
5	Seal for intake valve	*	
6	Temperature sensor	*	
7	Elastomer	*	
8	Air filter hose		air filter- air intake
9	Pressure sensor		

Note:

- 1.Please use our original parts, otherwise we will not be responsible for any machine accident.
- 2.The required items with "*" sign in the required items column in the table shall be at least one spare set
- 3.When ordering spare parts, please note: A. Compressor type, factory number. B. Part number, name, quantity.

3.BELT ADJUSTMENT

Belt transmission type, in the new machine first run after 30 hours must check the belt, if there is too loose phenomenon, should be adjusted immediately, and then every 1500 hours to adjust once.



Type	Load (kg)	Deformation amount (mm)
22KW	3.4	8-10
37KW	3.0	8-10
55-110KW	3.0	9-12

1.As shown in the figure, the load is applied to the belt to measure its deformation by means of a tension and spring balancer. If the deformation is within the standard value, the safety need not be adjusted. If the deformation exceeds the standard value, the tension of the belt can be adjusted.

2.When adjusting the belt tension, first loosen the four fixed screws of the motor base, then adjust the belt with the adjustment screws, then tighten the fixed screws of the motor after measuring with the tension meter.

3.If you want to replace the belt, all the belts must be replaced together, not only to replace a belt, otherwise the tension will not be balanced

4.Pay attention to adjustment or replacement, do not spill oil on the belt or belt pulley.

CHAPTER 7 TROUBLE SHOOTING

1. Trouble shooting table

Item	Trouble situation	Possible causes	What to do
1.	Unable to start (No fault display) Display-20°C, Remote control	line or wire failure or looseness	Please have the electrician check and replace it.
2.	Unable to start (Electric fault light on)	1. fuse blew out 2. Protective relay 3. Starting relay failure 4. bad contact with start button 5. voltage lower 6. Motor fault 7. Air end fault 8. Protective relay when lost one phase	1. Please have the electrician check and replace it. 2. Please have the electrician check and replace it. 3. Please have the electrician check and replace it. 4. Please have the electrician check and replace it. 5. Please have the electrician check and replace it. 6. Please have the electrician check and replace it. 7. Turn rotor by hand if not working, please contact service unit. 8. Inspect wire and connect point.
3.	Display Y-△, start but not run	1. Emergency button fault 2. Control wire fault or loose	1. Change with new part. 2. Please have the electrician check and replace it.
4.	Running current high, tripping	1. The voltage is too low 2. Exhaust pressure is too high 3. The specification of lubricating oil is incorrect 4. Loose belt drive (Type D) 5. The oil and gas separator is blocked (the lubricating oil pressure is high) 6. Air end failure	1. Please have the electrician check and replace it. 2. Check the pressure gauge, if the pressure exceeds the set pressure, adjust the pressure switch. 3. Check the oil number and replace the oil, please refer to Section 5-1. 4. Check and make adjustment. 5. Replace the oil and gas separator. 6. Rotate it by hand, if it can't be rotated, please contact our service unit.
5.	The running current is lower than the normal value	1. Too much air consumption (operate when the pressure is below the set value) 2. The air filter is clogged 3. Poor action of intake valve (butterfly valve is stuck and does not work) 4. Improper adjustment of air volume control valve	1. Check the consumption and increase the compressor if necessary. 2. Clean or replace. 3. Disassemble, clean and add lubricating grease. 4. Reset the adjustment.
6.	The discharge Temp. is lower than normal value (<75°C)	1. Too much cooling water 2. The ambient temperature is low 3. No load for too long 4. The exhaust temperature gauge is incorrect 5. Thermal control valve failure	1. Adjust the outlet valve of the cooling water. If it is an air-cooled cooler, the cooling area of the cooler can be reduced. 2. Adjust the outlet valve of the cooling water and use the air-cooled cooler to reduce the cooling area of the cooler. 3. Increase air consumption 4. Replace the exhaust temperature gauge. 5. Replace the thermal control valve.

Item	Trouble situation	Possible causes	What to do
7.	High exhaust temperature, air compressor self-tripping, the exhaust high temperature indicator light is on(105°Cabove the set value)	<ol style="list-style-type: none"> 1. Insufficient lubricating oil 2. Insufficient cooling water 3. The cooling water temperature becomes higher 4. High ambient temperature 5. The oil cooler is blocked 6. Incorrect specification of lubricating oil 7. Thermal control valve failure 8. The air filter is not clean 9. The oil filter is clogged 10. Cooling fan failure 	<ol style="list-style-type: none"> 1. Check the oil level, if it is lower than "L", please stop and refuel to "H". 2. Check the temperature difference between the inlet and outlet pipes. 3. Check the water temperature. 4. Increase exhaust and reduce room temperature. 5. Check the temperature difference between the inlet and outlet pipes. The normal temperature difference is about 5° C. If it is lower than 5° C, the oil cooler may be blocked. Remove it and clean it with chemicals. 6. Check the oil number and replace the oil, please refer to Section 5-1. 7. Check whether the oil is cooled by the oil cooler, if not, replace the thermal control valve. 8. Clean the air filter with low pressure air. 9. Replace the oil filter. 10. Replace the cooling fan.
8.	The air has high oil content, the lubricating oil adding period is shortened, and the filter smokes when there is no load	<ol style="list-style-type: none"> 1. The oil level is too high 2. The flow restriction hole of the oil return pipe is blocked 3. Low exhaust pressure 4. Pressure maintenance valve spring fatigue 	<ol style="list-style-type: none"> 1. Check the oil level and drain to between "H" and "L". 2. Disassemble and clean. 3. Increase the exhaust pressure (adjust the pressure switch to the set value). 4. Replace with new ones.
9.	Unable to run under fully loading	<ol style="list-style-type: none"> 1. Pressure (sensor) failure 2. Three-way solenoid valve failure 3. Delay relay failure 4. Poor action of intake valve 5. Poor action of the pressure maintenance valve 6. Control pipeline leakage 	<ol style="list-style-type: none"> 1. Replace with new product. 2. Replace the new flat. 3. Ask electrical personnel to overhaul and replace. 4. Add lubricating grease after disassembly and cleaning. 5. After disassembly, check whether the valve seat and check valve plate are worn, and replace them if worn. 6. Check the leakage position and lock it.
10.	Cannot run unload, when run pressure meter keep working pressure or pressure continue increase	<ol style="list-style-type: none"> 1. Pressure (sensor) failure 2. Poor action of intake valve 3. The discharge solenoid valve fails (the coil burns out) 4. Air volume adjustment diaphragm is damaged 5. Discharge hole too small 	<ol style="list-style-type: none"> 1. Overhaul and replace if necessary 2. Add lubricating grease after disassembly and cleaning. 3. Overhaul and replace if necessary 4. Maintenance and replacement 5. Extend hole diameter
11.	Compressor air flow below normal	<ol style="list-style-type: none"> 1. The intake filter is clogged 2. Air valve fault 3. pressure valve fault 4. Oil and air filter block 5. Leakage of release solenoid valve 	<ol style="list-style-type: none"> 1. Clean or replace 2. Disassembly and cleaning, then fill grease 3. Disassembly and inspect valve base and check valve worn or not, if worn need to change 4. Check , if needed ,change 5. Check , if needed ,change

Item	Trouble situation	Possible causes	What to do
12.	Frequent load or unloading	<ol style="list-style-type: none"> 1. Pipeline leakage 2. Unstable air consumption 3. Pressure maintenance valve failure 	<ol style="list-style-type: none"> 1. Check the leakage position and lock it. 2. Increase the capacity of air tank 3. Replace the pressure maintaining valve.
13.	When stop running, oil mist out from air filter	<ol style="list-style-type: none"> 1. leakage from oil stop valve 2. check-valve leakage 3. Load and stop 4. Electrical wiring error 5. Leakage of the pressure maintenance valve 6. The relief valve is not released 	<ol style="list-style-type: none"> 1. Check and replace if necessary. 2. Check whether the valve plate and valve seat are worn, and replace them if worn. 3. Check whether the intake valve is stuck, if it is stuck, disassemble and clean it and add lubricating grease. 4. Please ask electrician to check and change 5. Overhaul and replace if necessary. 6. Check the relief valve and replace it if necessary.

2. Maintenance record sheet

Total running time(h)	Air filter	Oil filter	Oil and air separator core	Replace the lubricating oil	Date	Signature

Note: Fill out "Clean/replaced" for air filter, Fill out "*L added/Oil No.*" For lubricating oil replacement And "Replacement" for other items.

3.Failure record sheet

Date	Maintenance	Signature



Green Technology That leads the future



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